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EXAMINER

MCCLOUD, RENATA D

ART UNIT PAPER NUMBER

2837

DATE MAILED: 07/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/943,705

Applicant(s)

EL-SADI, ASHRAF

Examiner

Renata McCloud

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 and 20-101 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 30-49 and 64-101 is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-18, 20-29, 50, 55-58, 61, 63 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. In response to the amendment filed 30 April 2003, paper number 12, the following has occurred:

(a) The objections to the specification have been withdrawn by the examiner due to changes made by the applicant.

(b) The claim objection has been withdrawn by the examiner due to changes made by the applicant.

(c) The 35 U.S.C 112 rejections have been withdrawn by the examiner due to the changes made by the applicant.

(d) Claims 1,12,13,14,27, and 29 have been amended.

(e) Claim 19 has been cancelled and claims 64-101 have been added. Now claims 1-18 and 20-101 are present for examination.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1,6,9, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baker (U.S. Patent 6,445,530) in view of Vitunic (U.S. Patent 5,859,518).

Claim 1: Baker teaches a driver having a current control device for a voice coil motor, capable of being used in a disk drive (e.g. Fig. 10; Col. 1:10-14), comprising a sensor to sense a coil current in a voice coil motor (e.g. Fig. 10:168); a transconductance amplifier (e.g. Fig. 12: 216) to detect an error current by comparing a coil current and a command current (e.g. Col. 8: 40-45). Baker does not teach a compensator to integrate the error current into a coil current. Vitunic teaches a driver having a current control device, capable of being used in a disk drive (e.g. Fig. 7), comprising a sensor to sense a coil current in a motor (e.g. Fig. 7: ISNSA); a transconductance amplifier (e.g. Fig. 7:234) to detect an error current by comparing an actual speed to a desired speed (e.g. Col. 15: 42-44); and a compensator to integrate the error current into a coil current (e.g. Col. 15: 44-53).

Claim 6: Baker and Vitunic teach the limitations of claim 1. Referring to claim 6, Vitunic teaches a compensator includes a capacitor (e.g. Fig. 7:250).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the driver taught by Baker include a compensator to include the teachings of Vitunic. The advantage of this would have been a reduction in speed error.

Claim 9: Baker and Vitunic teach the limitations of claim 1. Referring to claim 9, Baker teaches the sensor including a sense resistor (e.g. Fig. 10: 168).

Claim 10: Baker and Vitunic teach the limitations of claim 1. Referring to claim 10, Baker teaches a command current received at a driver (e.g. Fig. 2: 148) from a microcontroller (e.g. Fig. 2: 144).

Claim 11: Baker and Vitunic teach the limitations of claim 1. Referring to claim 11, Vitunic teaches a compensator, including a capacitor (e.g. Fig. 7: 250), coupled to the transconductance amplifier (e.g. Fig. 7: 234).

Claim 12: Baker and Vitunic teach the limitations of claim 1. Referring to claim 12, Vitunic teaches the driver including a capacitor (e.g. Fig. 7: 252).

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Baker and Vitunic as applied to claim 1 above, and further in view of Lian et al (U.S. Patent 5,731,935).

Claim 4: Baker and Vitunic teach the limitations of claim 1. Referring to claim 4, they do not teach first and second coil motors. Lian et al teach first and second coil motors (e.g. Fig. 5:40, 40; Col. 4: 41-45).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the driver taught by Baker and Vitunic to include two coil motors as taught by Lian et al. The advantage of this would be improved velocity control.

5. Claims 2, 3, 6, 7, 8, 11, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baker and Vitunic as applied to claim 1 above, and further in view of Mortazavi et al (U.S. Patent 5,838,515).

Claim 2: Baker and Vitunic teach the limitations of claim 1. Referring to claim 2, they do not teach a force couple created by the current in the VCM. Mortazavi et al teach a force couple created by the current in the VCM (e.g. Column 10, Lines 20-26).

Claim 3: Baker and Vitunic teach the limitations of claim 1. Referring to claim 3, they do not teach a current sense amplifier coupled to a transconductance amplifier. Mortazavi et al teach a current sense amplifier (e.g. Fig. 2:66) coupled to a transconductance amplifier (e.g. Fig. 2: 64) to amplify a voltage across a sensor.

Claim 6: Baker and Vitunic teach the limitations of claim 1. Referring to claim 6, Vitunic teaches a compensator including a capacitor (e.g. Fig. 7:250). Mortazavi et al also teach a compensator (e.g. Fig. 2: 56) including a capacitor (e.g. Fig. 2: C4).

Claim 7: Baker and Vitunic teach the limitations of claim 6. Referring to claim 7, they do not teach a compensator including a resistor. Mortazavi et al teach a compensator (e.g. Fig. 2: 56) including a resistor (e.g. Fig. 2: R3).

Claim 8: Baker and Vitunic teach the limitations of claim 1. Referring to claim 8, they do not teach a driver amplifier coupled to a compensator to supply a coil current. Mortazavi et al teach a driver amplifier (e.g. Fig. 2: 62) coupled to a compensator (e.g. Fig. 2: 56) to supply a coil current.

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Claim 11: Baker and Vitunic teach the limitations of claim 1. Referring to claim 11, Vitunic teaches a compensator, including a capacitor (e.g. Fig. 7: 250), coupled to the transconductance amplifier (e.g. Fig. 7: 234). Mortazavi et al also teach a compensator (e.g. Fig. 2: 58), including a capacitor (e.g. Fig. 2:C4), coupled to the transconductance amplifier (e.g. Fig. 2: 64).

Claim 13: Baker and Vitunic teach the limitations of claim 11. Referring to claim 13, they do not teach the compensator coupled to a gain buffer. Mortazavi et al teach the compensator coupled to a gain buffer (e.g. Column 7, Lines 13-25, the driver includes buffer 46 in figure 1, which is used for transferring data, such as gain).

It would have been obvious to one having ordinary skill in the art at the time that the invention was made to modify the apparatus taught by Baker and Vitunic to include the teachings of Mortazavi et al. The advantage of this would have been improved control of velocity, acceleration, and deceleration.

6. Claims 14-18 and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mortazavi et al (U.S. Patent 5,838,515) in view of Baker (U.S. Patent 6,445,530) and Vitunic (U.S. Patent 5,859,518).

Claim 14: Mortazavi et al teach a method for tracking a disk using a voice coil motor coupled to a driver by sensing a coil current (e.g. Column 4, Lines 39-41) and integrating the error current into the coil current (e.g. Col. 4: 44-46). Mortazavi et al do not teach determining an error current by comparing a coil current and a command current. Baker teaches sensing a coil current in a voice coil motor (e.g. Fig. 10:168); a

determining an error current by comparing a coil current and a command current (e.g. Col. 8: 40-45). Baker does not teach integrating the error current into the coil current. Vitunic teaches integrating the error current into a coil current (e.g. Col. 15: 44-53).

It would have been obvious to one having ordinary skill in the art at the time that the invention was made to modify the apparatus taught by Mortazavi et al to include the teachings of Baker and Vitunic. The advantage of this would have been improved control of current.

Claim 15: Mortazavi et al, Baker and Vitunic et al teach the limitations of claim 14. Referring to claim 15, Mortazavi et al teach amplifying the coil current (e.g. Column 4, Lines 42-43).

Claim 16: Mortazavi et al, Baker and Vitunic et al teach the limitations of claim 14. Referring to claim 16, Mortazavi et al teach receiving the command current at the driver (e.g. Column 4, Lines 47-48).

Claim 17: Mortazavi et al, Baker and Vitunic et al teach the limitations of claim 14. Referring to claim 17, Mortazavi et al teach inducing a magnetic field in the VCM (e.g. Column 7, Lines 30-35).

Claim 18: Mortazavi et al, Baker and Vitunic et al teach the limitations of claim 14. Referring to claim 18, Mortazavi et al teach sensing a voltage and determining the coil current from the voltage (e.g. Column 7, Lines 35-47).

Claim 20: Mortazavi et al, Baker and Vitunic et al teach the limitations of claim 14. Referring to claim 20, Baker teaches determining the error current with a transconductance amplifier (e.g. Col. 8:40-45).

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Claim 21: Mortazavi et al, Baker and Vitunic et al teach the limitations of claim 20. Referring to claim 21, Baker teaches comparing the coil current and the command current at the transconductance amplifier (e.g. Col. 8:40-45).

Claim 22: Mortazavi et al, Baker and Vitunic et al teach the limitations of claim 14. Referring to claim 22, Mortazavi et al teach compensating for the error current (e.g. Column 4, Lines 44-46).

7. Claim 23-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mortazavi et al (U.S. Patent 5,838,515) in view of Baker (U.S. Patent 6,445,530).

Claim 23: Mortazavi et al teach a current control device for a voice coil motor (VCM) drive with the VCM driver coupled to a microprocessor to receive commands specifying a command current for a VCM (e.g. Column 5, Lines 28-40) with an amplifier to drive the VCM with a coil current (e.g. Figure 2, Item 62) a compensator circuit (e.g. Fig. 2:56) to integrate an error signal with a command signal to generate a coil current (e.g. Col. 4: 44-46) and a sensor (e.g. Fig. 2: R5) coupled between the amplifier (e.g. Fig. 2: 62) and the VCM (e.g. Fig 2:24). Mortazavi et al does not teach the signals being current signals. Baker teaches the signals being current signals (e.g. Col. 8: 40-45). It would have been obvious to one having ordinary skill in the art at the time that the invention was made to modify the apparatus taught by Mortazavi et al to include the teachings of Baker. The advantage of this would have been improved current control.

Claim 24: Mortazavi et al and Baker teach the limitations of claim 23. Referring to claim 24, Baker teaches determining the error current with a transconductance amplifier (e.g. Col. 8:40-45).

Claim 25: Mortazavi et al and Baker teach the limitations of claim 23. Referring to claim 25, Baker teaches the error current correlates to a voltage across the sensor (e.g. Col. 8:40-45).

Claim 26: Mortazavi et al and Baker teach the limitations of claim 23. Referring to claim 26, Mortazavi et al teach the sensor is a resistor (e.g. Fig. 2:R5).

Claim 27: Mortazavi et al and Baker teach the limitations of claim 23. Referring to claim 27, Mortazavi et al teach a current sense amplifier (e.g. Fig. 2: 66) coupled between a sensor (e.g. Fig. 2: R5) and a compensator (e.g. Fig. 2: 56).

Claim 28: Mortazavi et al and Baker teach the limitations of claim 23. Referring to claim 28, Mortazavi et al teach the amplifier coupled to a set of transistors (e.g. Column 3, Lines 13-16).

8. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mortazavi et al (U.S. Patent 5,838,515) in view of Vitunic (U.S. Patent 5,859,518).

Claim 29: Mortazavi et al teach a driver having a current control device for a vcm comprising an amplifier to drive the vcm with a coil current, the coil current flows from one terminal of the vcm to another terminal (e.g. Col. 3, Lines 10-16), wherein both terminals are coupled to the driver (e.g. Fig. 2: 24 connected to 62 at 60 and VCMP), a sensor coupled between the amplifier and the vcm to sense coil current (e.g. Fig. 2,

Item R5), a current sense amplifier that amplifies a voltage across a sensor where the voltage correlates to the coil current (e.g. Figure 2, Item 66), a transconductance amplifier coupled to a current sense amplifier to receive a voltage and a command current (e.g. Fig. 2: 64), and an integrator (e.g. Fig. 2: 56) coupled to the transconductance amplifier (e.g. Fig. 2: 64) to integrate the error signal into the coil current (e.g. Col. 4: 44-48). Mortazavi et al do not teach the error signal being a current signal. Vitunic teaches integrating an error current (e.g. Col. 15: 42-46).

It would have been obvious to one having ordinary skill in the art at the time that the invention was made to modify the apparatus taught by Mortazavi et al to include the teachings of Vitunic. The advantage of this would have been improved position control.

9. Claims 50, 57, 58, 61, and 63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mohlere (U.S. Patent 4,422,027) in view of Hassan et al (U.S. Patent 5,821,717).

Claims 50 and 58: Mohlere teaches a driver and a method for controlling a voice coil motor (e.g. Figure 2) having a first coil motor and a second coil motor (e.g. Figure 2, Items Unit 1, and Unit 2, Column 1, Lines 10-14 and Lines 60-62), comprising a sensor to sense a velocity voltage across a coil motor (e.g. Column 2, Lines 40-45). Mohlere does not teach an error amplifier to calculate a differential between a velocity voltage and a command voltage and a retract amplifier to compensate a command voltage with a differential. Hassan et al teach an error amplifier to calculate a differential between a

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velocity voltage and a command voltage (e.g. Column 3, Lines 20-37) and a retract amplifier to compensate a command voltage with a differential (e.g. Figure 2, Item 113, Column 5, Lines 37-67).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of Mohlere to include the teaching of Hassan et al. The advantage of this would be the improvement in velocity control and the reduction of both noise and complicated circuitry.

Claims 57 and 63: Mohlere and Hassan et al teach the limitations of claims 50 and 58. Referring to claims 57 and 63, Hassan et al teach the retract amplifier being turned on and off (e.g. Column 5, Lines 37- 67).

Claim 61: Mohlere and Hassan et al teach the limitations of claim 58. Referring to claim 61, Hassan et al teach the retract amplifier coupled to the voice coil motor (e.g. Figure 2, Item 131 connected to 300).

10. Claims 55 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mohlere in view of Hassan et al as applied to claim 50 above, and further in view of Mortazavi et al (U.S. Patent 5,838,515).

Claims 55 and 56: Mohlere and Hassan et al teach the limitations of claim 50. Referring to claims 55 and 56, they do not teach the coil motors comprising coil windings. Mortazavi et al teach a coil motor comprising a coil winding (e.g. Figure 2,

Item 24). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention taught by Mohlere in view of Hassan et al to include the coil motors comprising coil windings as taught by Mortazavi et al. The advantage of this would be the improvement of the velocity control of the driver.

Allowable Subject Matter

11. Claims 30-49 and 64-101 are allowed.

Response to Arguments

12. Applicant's arguments with respect to claims 1-18, and 20-63, have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Renata McCloud whose telephone number is (703) 308-1763. The examiner can normally be reached on Mon.- Fri. from 8 am - 5pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Nappi can be reached on (703) 308-3370. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Renata McCloud
Examiner
Art Unit 2837

RDM
July 14, 2003



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